

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
 United States Patent and Trademark  
 Office  
 Box PCT  
 Washington, D.C.20231  
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

<b>Date of mailing (day/month/year)</b> 18 May 2000 (18.05.00)	
<b>International application No.</b> PCT/GB99/01958	<b>Applicant's or agent's file reference</b> IP14577
<b>International filing date (day/month/year)</b> 23 June 1999 (23.06.99)	<b>Priority date (day/month/year)</b> 22 September 1998 (22.09.98)
<b>Applicant</b> STEVENSON, David, Gordon	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

18 April 2000 (18.04.00)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
 34, chemin des Colombettes  
 1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Anman QIU

Telephone No.: (41-22) 338.83.38

PCT

NOTIFICATION OF THE RECORDING  
OF A CHANGE(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

JOHNSON, Terence, Leslie  
Edward Evans & Co.  
Clifford's Inn  
Fetter Lane  
London EC4A 1BX  
ROYAUME-UNI

Date of mailing (day/month/year) 18 May 2000 (18.05.00)	<b>IMPORTANT NOTIFICATION</b>
Applicant's or agent's file reference IP14577	
International application No. PCT/GB99/01958	International filing date (day/month/year) 23 June 1999 (23.06.99)

## 1. The following indications appeared on record concerning:

☐ the applicant      ☐ the inventor      ☒ the agent      ☐ the common representative

Name and Address JOHNSON, Terence, Leslie Edward Evans & Co. Chancery House 53-64 Chancery Lane London WC2A 1SD United Kingdom	State of Nationality	State of Residence
	Telephone No. 0171 405 4916	
	Facsimile No. 0171 831 0343	
	Teleprinter No.	

## 2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person      ☐ the name      ☒ the address      ☐ the nationality      ☐ the residence

Name and Address JOHNSON, Terence, Leslie Edward Evans & Co. Clifford's Inn Fetter Lane London EC4A 1BX United Kingdom	State of Nationality	State of Residence
	Telephone No. 0171 405 4916	
	Facsimile No. 0171 831 0343	
	Teleprinter No.	

## 3. Further observations, if necessary:

## 4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO 34, chemin des Colmbettes 1211 Geneva 20, Switzerland	Authorized officer  Anman QIU
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

## INTERNATIONAL SEARCH REPORT

Int .tional Application No

PCT/GB 99/01958

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 B01D24/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 25 34 430 A (LEDERLE GMBH WASSERVERSORGUNG) 10 February 1977 (1977-02-10)	1,2,4,6, 8-10, 15-19
Y	figures 1,2	7,13,14
Y	DE 26 00 897 A (AUGUST GOETTKER BOHRGESELLSCHA) 21 July 1977 (1977-07-21)	13,14
Y	DE 696 400 C (OTTO JOCH) 22 August 1940 (1940-08-22)	7
	figures 1,3	

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

28 September 1999

Date of mailing of the international search report

06/10/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

De Paepe, P

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

/GB 99/01958

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 2534430	A	10-02-1977	NONE	
DE 2600897	A	21-07-1977	NONE	
DE 696400	C		NONE	

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>IP14577</b>	<b>FOR FURTHER ACTION</b> <small>see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.</small>	
International application No. <b>PCT/GB 99/ 01958</b>	International filing date (day/month/year) <b>23/06/1999</b>	(Earliest) Priority Date (day/month/year) <b>22/09/1998</b>
Applicant  <b>THAMES WATER UTILITIES LIMITED et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1  
☐ None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/01958

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 B01D24/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 25 34 430 A (LEDERLE GMBH WASSERVERSORGUNG) 10 February 1977 (1977-02-10)	1, 2, 4, 6, 8-10, 15-19
Y	figures 1, 2	7, 13, 14
Y	DE 26 00 897 A (AUGUST GOETTKER BOHRGESELLSCHA) 21 July 1977 (1977-07-21) figures 2, 3	13, 14
Y	DE 696 400 C (OTTO JOCH) 22 August 1940 (1940-08-22) figures 1, 3	7

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## ° Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

28 September 1999

Date of mailing of the international search report

06/10/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

De Paepe, P

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/01958

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 2534430	A	10-02-1977	NONE	
DE 2600897	A	21-07-1977	NONE	
DE 696400	C		NONE	

14 DEC 2000

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

JOHNSON, Terence L.  
EDWARD EVANS & CO.  
CLIFFORD'S INN  
FETTER LANE  
London EC4A 1BX  
GRANDE BRETAGNE

PCT

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing  
(day/month/year)

11.12.2000

Applicant's or agent's file reference  
IP14577

## IMPORTANT NOTIFICATION

International application No.  
PCT/GB99/01958

International filing date (day/month/year)  
23/06/1999

Priority date (day/month/year)  
22/09/1998

Applicant

THAMES WATER UTILITIES LIMITED et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

## 4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



European Patent Office  
D-80298 Munich  
Tel. +49 89 2399 - 0 Tx: 523656 epmu d  
Fax: +49 89 2399 - 4465

Authorized officer

Ipinazar, P

Tel. +49 89 2399-8131





# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>IP14577</b>	<div style="display: flex; justify-content: space-between;"> <div> <b>FOR FURTHER ACTION</b> </div> <div>           See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)         </div> </div>	
International application No. <b>PCT/GB99/01958</b>	International filing date ( <i>day/month/year</i> ) <b>23/06/1999</b>	Priority date ( <i>day/month/year</i> ) <b>22/09/1998</b>
International Patent Classification (IPC) or national classification and IPC <b>B01D24/24</b>		
Applicant <b>THAMES WATER UTILITIES LIMITED et al.</b>		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of    sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li>I   <input checked="" type="checkbox"/> Basis of the report</li> <li>II   <input type="checkbox"/> Priority</li> <li>III   <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li>IV   <input type="checkbox"/> Lack of unity of invention</li> <li>V   <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li>VI   <input type="checkbox"/> Certain documents cited</li> <li>VII   <input checked="" type="checkbox"/> Certain defects in the international application</li> <li>VIII   <input checked="" type="checkbox"/> Certain observations on the international application</li> </ul>		
Date of submission of the demand  <b>18/04/2000</b>	Date of completion of this report  <b>11.12.2000</b>	
Name and mailing address of the international preliminary examining authority:  <div style="display: flex; align-items: center;"> <div>             European Patent Office              D-80298 Munich              Tel. +49 89 2399 - 0 Tx: 523656 epmu d              Fax: +49 89 2399 - 4465           </div> </div>	Authorized officer  <b>Semino, D</b>  Telephone No. +49 89 2399 7324	



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/01958

**I. Basis of the report**

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

**Description, pages:**

1-13 as originally filed

**Claims, No.:**

1-19 as originally filed

**Drawings, sheets:**

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).  
☐ the language of publication of the international application (under Rule 48.3(b)).  
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority in written form.  
☐ furnished subsequently to this Authority in computer readable form.  
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.  
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/01958

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes:	Claims	3-5,11
	No:	Claims	1,2,6-10,12-19
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-19
Industrial applicability (IA)	Yes:	Claims	1-19
	No:	Claims	

2. Citations and explanations  
**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Pertinence of the cited prior art**

- 1.1 Document D1 (DE-A-2534430) discloses (cf. claim 1 and Figure 1 and 2) a filter for water cleaning comprising a plurality of tubes (cf. element 5) disposed in parallel to each other adjacent the base of the filter having a plurality of slots (cf. element 8) directed longitudinally along the tubes and arranged in rows all around them adapted to allow passage therethrough of the fluid but not of the filter particles (cf. dimensions in claim 5). The tubes are normally used as the water outlet, but are appropriate for use also during backwashing (cf. p. 2, l. 26-30 and p. 5, second paragraph), when the backwash fluid is admitted through a common central supply pipe (cf. element 7) and is then uniformly distributed throughout the filter surface. The tubes may be made of plastic (cf. claim 8).
- 1.2 Document D2 (DE-A-2600897) discloses (cf. claims 1-3 and Figures 1 and 2) a method for forming slots in a well filter by moving the filter pipe relative to a laser beam directed onto it. The motion is such that slots are formed either in rows along the pipe axis or around its circumference. The filter pipes are for use in drawing water out of wells to prevent sand entrainment; therefore they are suitable to be used for admitting a backwash fluid to the filter medium of a filter bed allowing the passage through the slots of the fluid but not of the media.
- 1.3 Document D3 (DE-C-696400) discloses (cf. claim and Figures) a filter for liquids adapted for backwashing comprising a lower chamber for admittance of backwash water and air, and a filter base formed by a plurality of V-shaped elements with openings for the admission of air and longitudinal slots for the admission of water.

**2. Conclusions**

- 2.1 D1 anticipates the subject-matter of claims 1, 2, 6, 8-10, 12, 14-19, which are therefore not novel (Article 33(2) PCT).

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/GB99/01958

- 2.2 D2 anticipates the subject-matter of claims 1, 2, 6, 8-10, 12-14, which are therefore not novel (Article 33(2) PCT).
- 2.3 D3 anticipates the subject-matter of claims 1, 2, 7, which are therefore not novel (Article 33(2) PCT).
- 2.4 Dependent claims 3-5 and 11 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, since they do not provide any additional unexpected technical effect.

**Re Item VII**

**Certain defects in the international application**

- 0. The following items of information are merely for the sake of expediency in case of any further regional examination before the EPO.
- 1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D3 is not mentioned in the description, nor are these documents identified therein.
- 2. Contrary to the requirements of Rule 11.13(m) PCT, the filter floor is indicated with reference sign 15 on pages 8 and 9 and with reference sign 5 in Figures 5 and 6.

**Re Item VIII**



**Certain observations on the international application**

- 1. The additional feature in claim 13 relates to the method of fabrication of the device and not to the device as such (Article 6 PCT as to clarity).

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference IP14577		<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)			
International application No. PCT/GB99/01958	International filing date (day/month/year) 23/06/1999	Priority date (day/month/year) 22/09/1998			
International Patent Classification (IPC) or national classification and IPC B01D24/24					
Applicant THAMES WATER UTILITIES LIMITED et al.					
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheets.</p>					
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"><li>I <input checked="" type="checkbox"/> Basis of the report</li><li>II <input type="checkbox"/> Priority</li><li>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li><li>IV <input type="checkbox"/> Lack of unity of invention</li><li>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li><li>VI <input type="checkbox"/> Certain documents cited</li><li>VII <input checked="" type="checkbox"/> Certain defects in the international application</li><li>VIII <input checked="" type="checkbox"/> Certain observations on the international application</li></ul>					
Date of submission of the demand 18/04/2000		Date of completion of this report 11.12.2000			
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer Semino, D Telephone No. +49 89 2399 7324 			

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/01958

**I. Basis of the report**

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*:

**Description, pages:**

1-13 as originally filed

**Claims, No.:**

1-19 as originally filed

**Drawings, sheets:**

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
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3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
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- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/01958

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims 3-5,11
	No: Claims 1,2,6-10,12-19
Inventive step (IS)	Yes: Claims
	No: Claims 1-19
Industrial applicability (IA)	Yes: Claims 1-19
	No: Claims

2. Citations and explanations  
**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**



**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Pertinence of the cited prior art**

- 1.1 Document D1 (DE-A-2534430) discloses (cf. claim 1 and Figure 1 and 2) a filter for water cleaning comprising a plurality of tubes (cf. element 5) disposed in parallel to each other adjacent the base of the filter having a plurality of slots (cf. element 8) directed longitudinally along the tubes and arranged in rows all around them adapted to allow passage therethrough of the fluid but not of the filter particles (cf. dimensions in claim 5). The tubes are normally used as the water outlet, but are appropriate for use also during backwashing (cf. p. 2, l. 26-30 and p. 5, second paragraph), when the backwash fluid is admitted through a common central supply pipe (cf. element 7) and is then uniformly distributed throughout the filter surface. The tubes may be made of plastic (cf. claim 8).
- 1.2 Document D2 (DE-A-2600897) discloses (cf. claims 1-3 and Figures 1 and 2) a method for forming slots in a well filter by moving the filter pipe relative to a laser beam directed onto it. The motion is such that slots are formed either in rows along the pipe axis or around its circumference. The filter pipes are for use in drawing water out of wells to prevent sand entrainment; therefore they are suitable to be used for admitting a backwash fluid to the filter medium of a filter bed allowing the passage through the slots of the fluid but not of the media.
- 1.3 Document D3 (DE-C-696400) discloses (cf. claim and Figures) a filter for liquids adapted for backwashing comprising a lower chamber for admittance of backwash water and air, and a filter base formed by a plurality of V-shaped elements with openings for the admission of air and longitudinal slots for the admission of water.

**2. Conclusions**

- 2.1 D1 anticipates the subject-matter of claims 1, 2, 6, 8-10, 12, 14-19, which are therefore not novel (Article 33(2) PCT).

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB99/01958

- 2.2 D2 anticipates the subject-matter of claims 1, 2, 6, 8-10, 12-14, which are therefore not novel (Article 33(2) PCT).
- 2.3 D3 anticipates the subject-matter of claims 1, 2, 7, which are therefore not novel (Article 33(2) PCT).
- 2.4 Dependent claims 3-5 and 11 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, since they do not provide any additional unexpected technical effect.

**Re Item VII**

**Certain defects in the international application**

0. The following items of information are merely for the sake of expediency in case of any further regional examination before the EPO.
1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D3 is not mentioned in the description, nor are these documents identified therein.
2. Contrary to the requirements of Rule 11.13(m) PCT, the filter floor is indicated with reference sign 15 on pages 8 and 9 and with reference sign 5 in Figures 5 and 6.

**Re Item VIII**

**Certain observations on the international application**

1. The additional feature in claim 13 relates to the method of fabrication of the device and not to the device as such (Article 6 PCT as to clarity).

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/01958

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes:	Claims	3-5,11
	No:	Claims	1,2,6-10,12-19
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-19
Industrial applicability (IA)	Yes:	Claims	1-19
	No:	Claims	

2. Citations and explanations  
**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Pertinence of the cited prior art**

- 1.1 Document D1 (DE-A-2534430) discloses (cf. claim 1 and Figure 1 and 2) a filter for water cleaning comprising a plurality of tubes (cf. element 5) disposed in parallel to each other adjacent the base of the filter having a plurality of slots (cf. element 8) directed longitudinally along the tubes and arranged in rows all around them adapted to allow passage therethrough of the fluid but not of the filter particles (cf. dimensions in claim 5). The tubes are normally used as the water outlet, but are appropriate for use also during backwashing (cf. p. 2, l. 26-30 and p. 5, second paragraph), when the backwash fluid is admitted through a common central supply pipe (cf. element 7) and is then uniformly distributed throughout the filter surface. The tubes may be made of plastic (cf. claim 8).
- 1.2 Document D2 (DE-A-2600897) discloses (cf. claims 1-3 and Figures 1 and 2) a method for forming slots in a well filter by moving the filter pipe relative to a laser beam directed onto it. The motion is such that slots are formed either in rows along the pipe axis or around its circumference. The filter pipes are for use in drawing water out of wells to prevent sand entrainment; therefore they are suitable to be used for admitting a backwash fluid to the filter medium of a filter bed allowing the passage through the slots of the fluid but not of the media.
- 1.3 Document D3 (DE-C-696400) discloses (cf. claim and Figures) a filter for liquids adapted for backwashing comprising a lower chamber for admittance of backwash water and air, and a filter base formed by a plurality of V-shaped elements with openings for the admission of air and longitudinal slots for the admission of water.

**2. Conclusions**

- 2.1 D1 anticipates the subject-matter of claims 1, 2, 6, 8-10, 12, 14-19, which are therefore not novel (Article 33(2) PCT).

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/GB99/01958

- 2.2 D2 anticipates the subject-matter of claims 1, 2, 6, 8-10, 12-14, which are therefore not novel (Article 33(2) PCT).
- 2.3 D3 anticipates the subject-matter of claims 1, 2, 7, which are therefore not novel (Article 33(2) PCT).
- 2.4 Dependent claims 3-5 and 11 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, since they do not provide any additional unexpected technical effect.

**Re Item VII**

**Certain defects in the international application**

- 0. The following items of information are merely for the sake of expediency in case of any further regional examination before the EPO.
- 1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D3 is not mentioned in the description, nor are these documents identified therein.
- 2. Contrary to the requirements of Rule 11.13(m) PCT, the filter floor is indicated with reference sign 15 on pages 8 and 9 and with reference sign 5 in Figures 5 and 6.

**Re Item VIII**

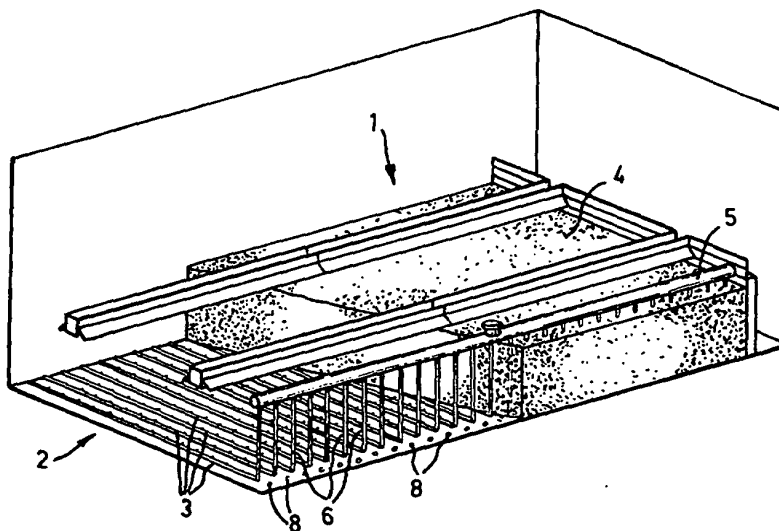
**Certain observations on the international application**

- 1. The additional feature in claim 13 relates to the method of fabrication of the device and not to the device as such (Article 6 PCT as to clarity).



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/GB99/01958 <b>(22) International Filing Date:</b> 23 June 1999 (23.06.99) <b>(30) Priority Data:</b> 9820624.6                      22 September 1998 (22.09.98)    GB <b>(71) Applicant (for all designated States except US):</b> THAMES WATER UTILITIES LIMITED [GB/GB]; Gainsborough House, Manor Farm Road, Reading, Berks RG2 0JN (GB). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> STEVENSON, David, Gor- don [GB/GB]; Firstones, Adbury Holt, Newtown, Newbury, Berks RG15 9BN (GB). <b>(74) Agent:</b> JOHNSON, Terence, Leslie; Edward Evans & Co., Chancery House, 53-64 Chancery Lane, London WC2A 1SD (GB).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>

**(54) Title:** FILTERS**(57) Abstract**

The invention relates to a filter (1) which has a backwashing system (2) comprising a plurality of members in the form of slotted stainless steel pipes or tubes, or "laterals", (3) extending laterally of the filter below the filter medium, sand in the embodiment, each tube being substantially parallel and each being connected in the embodiment to a manifold or air supply pipe (5) by a respective supply means or downpipe (6). Each tube (3) has a plurality of longitudinally extending slots (7), through the circumference of the tubes, the slots being in the embodiment 0.25 mm in width and being arranged in groups of three at different "levels", the two "upper" (7', 7'') ones as viewed and as in use being angularly spaced by 120°, and the lower one (7''') being in use on the floor of the filter. The slots are preferably formed by a laser cutting device to provide uniformity of width and length, and with little or no swarf.

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## FILTERS

The invention relates to a filter, particularly to granular media filters for removing impurities from water in for example water treatment works.

Granular media filters as generally used in water treatment comprise a bed such as sand, anthracite, or the like particulate material, either alone or in combination, contained within a tank or pressure vessel and supported on a porous floor system connected to an outlet.

Water to be filtered is usually fed in at the top, flows through the porous granular bed and out through the floor, or underdrain, systems. The latter must be able to support the dead weight of the medium as well as the pressure loss resulting from the flow and also it must be porous to permit the water to pass while retaining the granular medium in position without passing to the outlet.

In addition, in most types of filter accumulated dirt is removed by passing water in the reverse direction at a higher rate than the forward flow. The distribution of this backwash water is in fact a more critical design feature than the forward flow.

There must be a minimum pressure loss at the point of discharge into the bed to achieve the desired evenness of flow across the bed. There are two factors that have to be considered, firstly the uniformity of flow into an empty filter through the ducts or pipes of the floor or underdrain, and secondly the control of the flow into the bed itself which has an unstable characteristic and can break down from even fluidisation into a situation known as spouting or boiling.



Indeed the rapid sand filtration process for the purification of water was invented early this century and is still used in a broadly similar form. Water treated with chemicals to collect contaminants into tiny particles is passed down through a bed of sand and the contaminants are retained by the sand allowing clean water to be collected in an underdrain system beneath the sand.

A variety of methods have been used to avoid particles of sand being carried down into the underdrain system, ranging from layers of gravel of decreasing size above the holes into the underdrains to the underdrains fitted with nozzles. A further general type of underdrain system comprises a plenum floor of porous material which allows water to flow through the pores.

It is common practice in washing filters to use gas, usually air to assist washing either before water or simultaneously with it. The same underdrain system should therefore be capable of distributing this air uniformly in the same way as with water.

Granular media filters, such as sand filters are generally cleaned of accumulated contaminant particles on a batch basis, using a backwashing process. The backwashing process is primarily a reverse flow of water up through the sand which carries the accumulated contaminants away to waste. In many filters, this process is improved by a flow of air up through the bed of sand which further agitates the sand grains and facilitates the removal of the contaminants.

In some designs of filter, the air and the backwash water are introduced concurrently through individual nozzles for distributing the upwards

flows of water and air respectively. In the majority of existing filters, the air flow precedes the water flow, with the air bubbles serving to loosen adhering contaminants for the water flow to carry away. The air assists the cleaning process by providing agitation.

Some modern systems utilise air and water distributed concurrently into the base of the sand bed, providing a combined air and water backwash. This is more effective than the separate air and water flows but requires special provisions to maintain the uniform distribution of air and water per unit area of filter floor. In some systems the air and water are combined in special nozzles below the sand. In other systems, the air and water are distributed separately and allowed to mingle close to the bottom of the sand bed so that virtually all of the sand bed is subject to a mixture of rising air and water.

Where a separate air distribution system is used, then a key factor is that the minimum aperture size through which the air or water, whether separate or combined, is introduced must be a small proportion of the minimum selected sand grain size to prevent ingress of the sand.

The second requirement for the means of introducing air is that the amount of air introduced to the bottom of the filter must be almost constant per unit area of filter floor, so that a similar amount of air rises up through each portion of the sand in the filter. Were this not the case, then it would be necessary to introduce excessive air into some parts of the filter to ensure an adequate flow to those parts receiving the least. If sufficient air is not supplied, then the sand would become clogged in those parts receiving inadequate air and the clogging would tend to propagate further into the sand bed, leading to failure of the

process.

In many designs the air and water are fed through the same ducts or pipes but the rates are then limited otherwise maldistribution occurs. A common alternative is the use of suspended floors with a plenum chamber below. The depth of the latter guarantees low velocities and stable uniform distribution but with the penalty of additional tank depth and often additional excavation.

To provide the necessary headlosses for distribution and to retain the medium nozzle strainer devices are extensively used. These add to the cost of the underdrain and also can be damaged, in some cases allowing the medium into the plenum or lateral pipes below.

Another prior system involves perforated lateral pipes which are buried in graded gravel of decreasing size from bottom to top. Hitherto it has not been possible to place the working media around the lateral without using gravel, in an economical manner, because of cost limitations and the difficulty of forming fine orifices in long lengths of pipe.

It is possible to operate with air and water distributed in sequence from the same lateral pipe, but difficult with air and water simultaneously over the lengths required for large filters as used in public water supply.

It is accordingly an object of the invention to seek to mitigate these disadvantages.

According to a first aspect of the invention there is provided a device for admitting a backwash fluid to filter medium of a filter bed,

comprising a member having a plurality of elongate through orifices adapted to allow passage therethrough of the fluid but not the media.

Thus, using the invention it is possible to provide elongate orifices, or slits or slots, hereinafter "a slot" or "slots" having a width less than the finest fraction of the filter medium.

The slots may each have a width of less than 0.5mm, suitably between 0.10 - 0.3mm and preferably about 0.25mm. This is operative in use to ensure that the finest fraction of media does not penetrate the member.

The member may comprise a tube and the slots may be directed longitudinally of the tube. This is a relatively simple yet effective construction.

The member may be a corrugated member, and the slots may be in walls of the corrugation and directed longitudinally thereof. This again provides a relatively simple yet effective construction.

The slots may be arranged in groups of a plurality of slots. This provides an effective arrangement for backwashing.

The slots may be arranged in more than one row. This provides for even distribution of air for backwashing.

The slots may be arranged in rows so that they provide slots both close to the bottom and to the top of the tube in any orientation of the tube. This again provides for effective backwashing.

The length of each slot may be not greater than the longitudinal pitch along a particular row of slots. This provides for effective backwashing too, particularly as the slots may be staggered along the length of the member.

The slots may be formed by a laser or other thermal cutting device, and may comprise any suitable material, such as for example stainless steel, brass, aluminium or plastic.

According to a second aspect of the invention there is provided a system for backwashing a filter medium of a filter bed, comprising a plurality of members as hereinbefore defined, extending substantially parallel to or radially of one another and each being connected with a fluid supply means.

The fluid supply means may comprise a supply pipe for each member and a common manifold to which each supply pipe is connected.

According to a third aspect of the invention there is provided a filter, comprising a system as hereinbefore defined.

The members may extend laterally of the filter, suitable at or adjacent the base of the filter.

Devices, systems and granular media filters embodying the invention are hereinafter, described by way of example, with reference to the accompanying drawings.

Fig. 1 is a schematic perspective view of one embodiment of sand filter

according to the invention;

Fig. 2 is an elevational view of part of a member according to the invention, to a larger scale than Fig. 1;

Fig. 3 is an enlarged view of detail 'A' of Fig. 2;

Fig. 4 is an enlarged view of detail 'B' of Fig. 3;

Fig. 5 is a schematic perspective view, partially broken away, of a second embodiment of granular media filter according to the invention;

Fig. 6 shows to a larger scale than that of Fig. 5, a section through the filter floor;

Figs. 7 and 8 show, again to an enlarged scale respective perspective and transverse sectional views of "laterals" for air used in the filter of Figs. 5 and 6;

Fig. 9 shows an embodiment of granular media filter according to the invention where a feed manifold is buried in filter media; and

Figs. 10 shows an embodiment of granular media filter according to the invention utilising alternating water and air laterals.

Referring to the drawings there is shown in Fig. 1 a filter 1 which has a backwashing system 2 comprising a plurality of members in the form of slotted stainless steel pipes or tubes, or "laterals", 3 extending laterally of the filter below the filter medium, sand in the embodiment,

each tube being substantially parallel and each being connected in the embodiment to a manifold or air supply pipe 5 by a respective supply means or downpipe 6.

Each tube 3 has a plurality of longitudinally extending slots 7, through the circumference of the tubes, the slots being in the embodiment 0.25mm in width and being arranged in groups of three at different "levels", the two "upper" 7', 7" ones as viewed and as in use being angularly spaced by 120°, and the lower one 7''' being in use on the floor of the filter. The slots are preferably formed by a laser cutting device to provide uniformity of width and length, and with little or no swarf.

The filter includes water nozzles 8.

Referring now to Figs. 5 to 10, a second embodiment of sand filter is shown in Fig. 5 which comprises a structure 10 most often in concrete but frequently in steel with side walls 11 and a side channel 12 and duct 13 to provide means of feeding and collecting through flow of water and also backwash water. A granular filtering medium 14 is supported on a floor 15 which incorporates or supports a matrix of nozzles or orifices 16 which collect the filtrate and distribute the backwash water. In the kind of floor shown these orifices or nozzles 16 connect with a set of lateral pipes or manifolds 17 which in turn connect with the main feeder/collector duct or pipe 13.

To assist washing, air may be applied sequentially or simultaneously. In the kind of filter floor described this is achieved by laying a second set of lateral pipes 18 in between the water nozzles 16 or above them.

These air laterals 18 are fed from an air manifold 19 which may be located above the filter medium 14 as in Fig. 5 or buried within it. Fig. 6 shows a section of an arrangement with water laterals 17 set in the concrete floor 15 and with air laterals 18 set above, and within the sand 14.

The air laterals 18, as described, are perforated with lines of fine slots 20 spaced around the lateral pipe as illustrated in Figs. 7 and 8.

Fig. 9 shows an embodiment where the feed manifold 19 is buried in the medium 14 and is also slotted to admit air and retain the medium. In this way the medium above the manifold is also aerated and cleaned.

Fig. 10 shows an embodiment with alternating water 17 and air 18 laterals, where the former are not buried in the concrete but laid above it. In this case the water laterals are not connected to strainers but are of a similar design to the air laterals and are slotted similarly. They will normally be of larger diameter. In this case the water laterals if used in a filter similar to that shown in Fig. 5 would still penetrate the wall of the filter into the duct 13.

Thus, in the embodiments of the invention fine slit lateral tubes, pipes or ducts are used to perform all the necessary functions. The slots, or slits, have a width less than that of the finest fraction of the granular medium so that super-imposed gravel layers are no longer necessary. These lateral pipes are suitably laid directly on the structural floor of the filter to distribute and collect water. They may also be used for the distribution of air and water in sequence. Where air is to be applied simultaneously separate systems of air and water distribution lateral



pipes may be laid between each other so that alternate pipes admit water and air respectively during washing.

In an alternative, separate air lateral systems are laid above or in between conventional lateral systems, or above gravel packing layers and in conjunction with nozzles which are then used for distribution of water only. One advantage of the separate lateral system is its suitability for retrofit conversions from separate sequential air and water to simultaneous air and water.

A particular feature of the fine slit or slotted pipe is the absence of separate components which as well as adding to cost can also become damaged. The length and width of the slits or slots and their spacing are as desired and the pressure loss is selected to achieve the intended accuracy of distribution. Because there are no intrusions into the pipe, as with many types of nozzle, the required accuracy can be achieved over longer lengths of pipe.

The avoidance of additional components and the labour involved in fitting them also reduces costs.

In one form pipes for use in filter underdrains may be slit with a fine slitting saw, but below 0.4mm these become rather fragile. Also sawing may create swarf which may block the slits unless considerable care is exercised.

In a preferred form laser cuts are used to achieve finer slits or slots. In this case the cut has a fused edge and a stringy swarf is not produced.

It is also preferred that the slits or slots be longitudinal (in contrast to common drainage pipes which are transverse) as in this direction the bending strength of the pipe is not compromised by the slit to the same extent.

It is inevitable that air lateral pipes will fill with water while the filter is in service. Laterals for water likewise may occasionally receive some air (e.g. on start up). Slits are therefore arranged in more than one line round the circumference of the pipe to permit filling and emptying, and the pressure loss through the slits during backwashing is always well in excess of the pressure difference corresponding to the head of water of the diameter.

In addition to laser cutting, and bearing in mind the sizes of filter media currently in use, other methods of forming fine slits may be used.

These could involve fusion of the pipe material, shearing as with expanded metal, and abrasive jet cutting.

By way of example and without restricting the scope of the invention, pipes used for water distribution may have a diameter of 50 to 150mm depending on the length and specific flow rate required, in lengths of several metres.

For air, typical diameters are 20 to 40mm e.g. in a preferred embodiment up to 38mm, say 32mm. Slits may be 0.15 - 0.3mm width and of lengths not exceeding the longitudinal pitch, but as required by the pressure loss calculations. Backwash water and air flow rates both range typically from 4 to 20 litres/m<sup>2</sup>/second. The spacing between

lateral pipes and the pitch of the slits along the pipes is usually between 150mm and 250mm, but may be outside these limits.

It is usual to connect lateral pipes of such sizes to a larger diameter "header" or feed pipe or pipes which penetrate the outer wall of the tank or vessel. Such headers can cast a shadow on the bed and cause the medium over them to be washed less efficiently. It is a further feature of the invention that such headers may also be cut in a similar way to distribute air, and so eliminate such shadows.

In the above it has been assumed that the slits are formed in a circular section pipe. Rectangular or square ducts may also be slit to allow air or water to be distributed. This may be preferred in the case of headers, which can then be fitted against the wall or bottom corner of the vessel.

Lastly for distribution and collection of water the fine slits or slots described above may be arranged as a matrix in flat or corrugated floor panels. In the latter case rows of slits may be provided at different heights in the side of the corrugations and air may be distributed from below into the inverted channels of the corrugated sheet and thence via the upper slits into the granular media above. The corrugations then act as a set of lateral pipes. However the pressure loss for air will be limited by the height of the corrugations. Also, the slits or slots may be formed in a rollable material, which when rolled into a tubular form provide a device embodying the invention.

It will be understood that the invention described with reference to the drawings may be modified.

Thus, the tubes 3 may extend directly into the manifold 5 at a low level

thereof, without the need for downpipes 6. Also, there may be three or more rows of slots 7 which may be arranged in any desired respective orientation. Where there are three rows, some will be close to the top and some close to the bottom.

It will be further understood that embodiments of the invention as described herein with reference to the drawings utilize slots in a pipe or duct which perform both the function of controlling the pressure loss, and therefore the accuracy of distribution of air and/or water in a cleaning operation for the filter, as well as preventing entry of the filter medium or media into the pipe or duct, without the necessity of providing a porous structure that would in time be blocked by fine dirt and without the need to utilise expensive strainers, nozzles or other fittings attached to lateral pipes or ducts. In addition, the invention allows for adjustment of pressure loss on a site by site basis. The air in all the embodiments does not convey the dirt from the filter, which is effected by the water, but assists the cleaning process by providing agitation of the granular media so as to loosen dirt which is then carried away. This is so whether the air is introduced separately or concurrently with the water.

CLAIMS

1. A device for admitting a backwash fluid to filter medium of a filter bed, comprising a member having a plurality of elongate through orifices adapted to allow passage therethrough of the fluid but not the media.
2. A device according to Claim 1, the elongate through orifices each comprising a slot.
3. A device according to Claim 2, the slots having a width of less than 0.5mm.
4. A device according to Claim 3, the width being between 0.10 - 0.3mm.
5. A device according to Claim 4, each slot having a width of 0.25mm.
6. A device according to any of Claims 2 to 5, the member comprising a tube and the slots being directed longitudinally of the tube.
7. A device according to any of Claims 2 to 5, the member being a corrugated member, and the slots being in walls of the corrugation and directed longitudinally thereof.
8. A device according to Claim 6 or Claim 7, the slots being arranged in groups of a plurality of slots.
9. A device according to Claim 8, the slots being arranged in more

than one row.

10. A device according to Claim 9, the slots being arranged in rows so that they provide slots both close to the bottom and to the top of the tube in any orientation of the tube.

11. A device according to Claim 9 or Claim 10, the length of each slot being not greater than the longitudinal pitch along a particular row of slots.

12. A device according to Claim 11, the slots being staggered along the length of the member.

13. A device according to any of Claims 2 to 12, the slots being formed by a laser or other thermal cutting device.

14. A device according to Claim 13, the members comprising stainless steel, brass, aluminium or plastic.

15. A system for backwashing a filter medium of a filter bed, comprising a plurality of members according to any previous claim, extending substantially parallel to or radially of one another and each being connected with a fluid supply means.

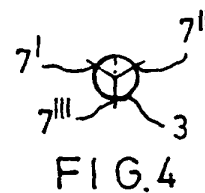
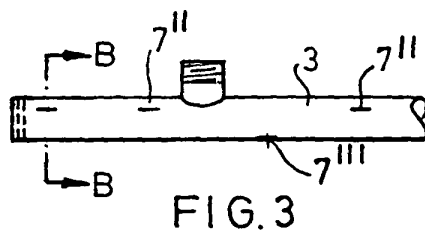
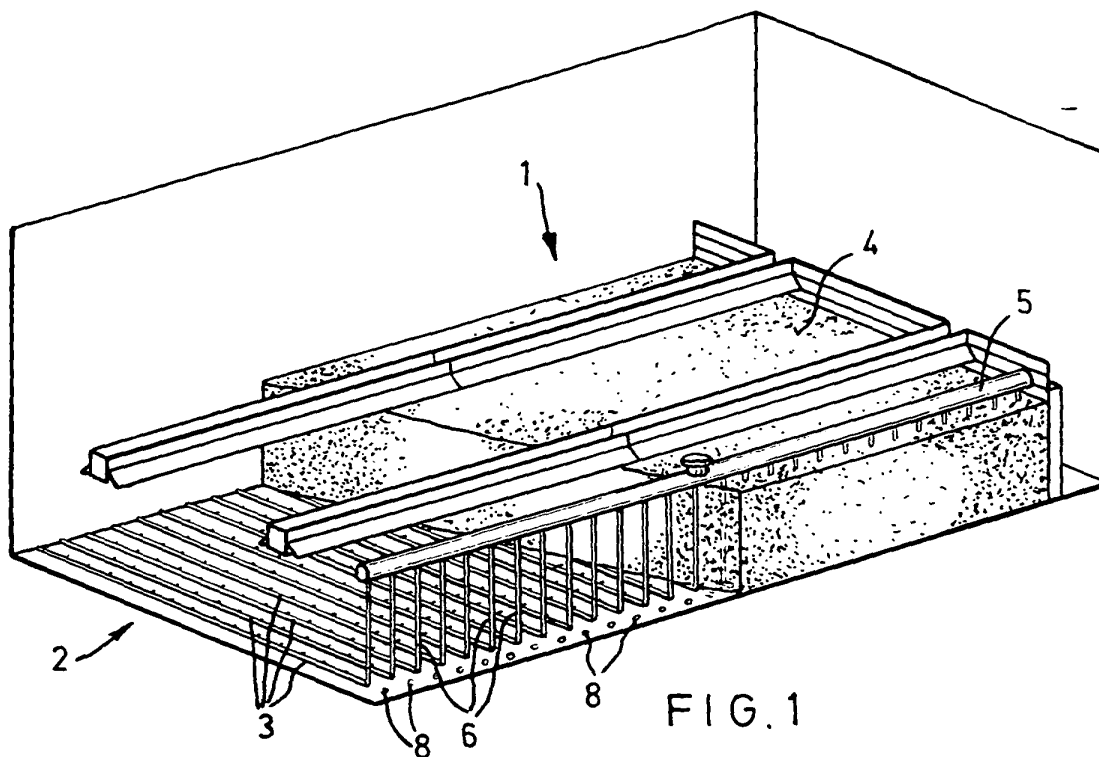
16. A system according to Claim 15, the fluid supply means comprising a supply pipe for each member and a common manifold to which each supply pipe is connected.

17. A filter, comprising a system according to Claim 16.

16

18. A filter according to Claim 17, the members extending laterally of the filter.

19. A filter according to Claim 18, the members being positioned at or adjacent the base of the filter.





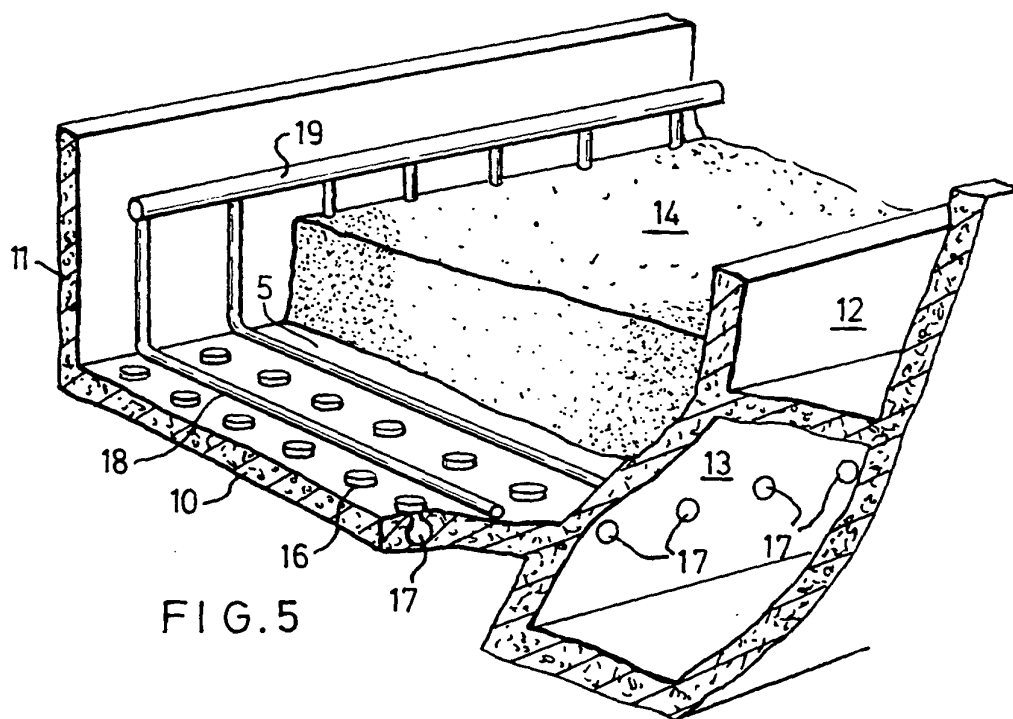


FIG. 5

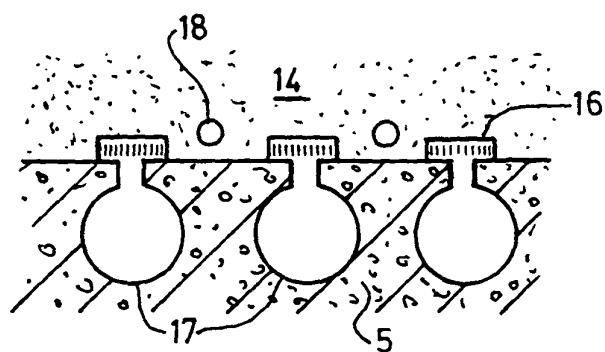


FIG. 6

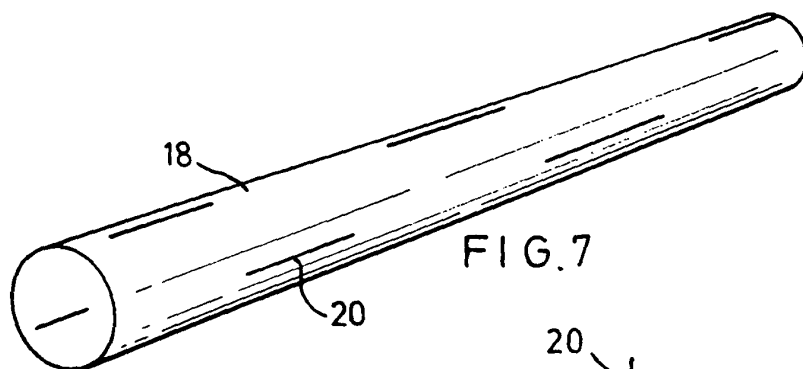


FIG. 7

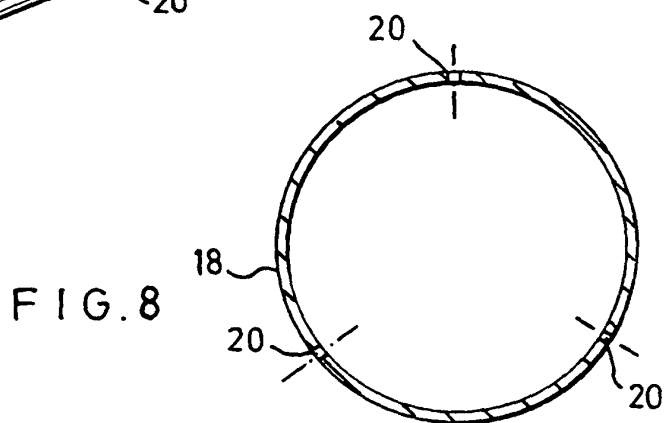


FIG. 8

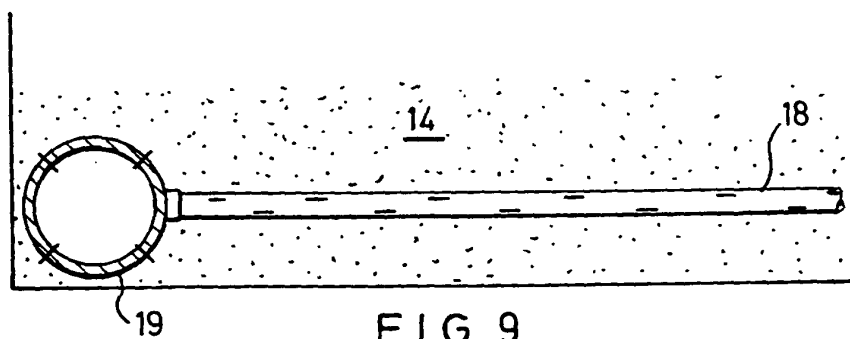


FIG. 9

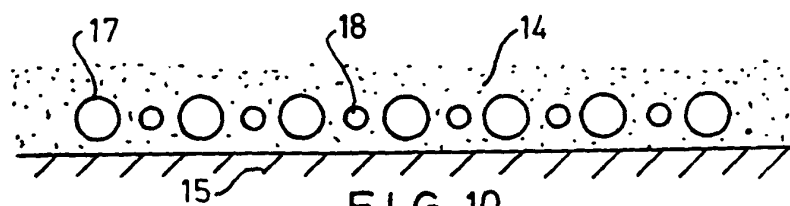


FIG. 10

## INTERNATIONAL SEARCH REPORT

International Application No

/GB 99/01958

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 B01D24/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 25 34 430 A (LEDERLE GMBH WASSERVERSORGUNG) 10 February 1977 (1977-02-10)	1, 2, 4, 6, 8-10, 15-19
Y	figures 1, 2 ---	7, 13, 14
Y	DE 26 00 897 A (AUGUST GOETTKER BOHRGESELLSCHA) 21 July 1977 (1977-07-21)	13, 14
	figures 2, 3 ---	
Y	DE 696 400 C (OTTO JOCH) 22 August 1940 (1940-08-22)	7
	figures 1, 3 -----	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents:

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

28 September 1999

Date of mailing of the international search report

06/10/1999

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De Paepe, P

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No  
/GB 99/01958

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 2534430	A	10-02-1977	NONE
DE 2600897	A	21-07-1977	NONE
DE 696400	C		NONE